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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/042,936	01/09/2002	Lars Langemyr	CMM-00202	4595
7590 Nixon Peabody LLP Clinton Square, P.O.Box 31051 Rochester, NY 14603		10/19/2007	EXAMINER [REDACTED]	SHARON, AYAL I
			ART UNIT [REDACTED]	PAPER NUMBER 2123
			MAIL DATE 10/19/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/042,936	LANGEMYR ET AL.	
	Examiner	Art Unit	
	Ayal I. Sharon	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 17 July 2007.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 118-181 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 118-181 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 08 April 2002 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

Introduction

1. New claims 118-181 of U.S. Application 10/042,936 are currently pending.
2. The Application is a CIP of U.S. Application 09/995,222, filed on 11/27/2001, which claims benefit to U.S. Application 60/253,154.
3. The Application is also a CIP of U.S. Application 09/675,778, filed on 9/29/2000, which claims benefit to U.S. Application 60/222,394.
4. Parent Application 09/675,778 has recently been appealed to the Board of Patent Appeals and Interferences (BPAI), over issues identical to those newly presented in this office action (as necessitated by applicants' amendments).

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. **Claims 118-181 are rejected under 35 U.S.C. 101 because the claimed invention preempts a 35 U.S.C. 101 judicial exception. The claims preempt every “substantial practical application” of an idea – a mathematical algorithm.**
7. One may not patent every “substantial practical application” of an idea, law of nature or natural phenomena because such a patent “in practical effect be a

patent on the [idea, law of nature or natural phenomena] itself." Gottschalk v. Benson, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972).

8. According to MPEP § 2106 (IV)(C)(3), a claim that recites a computer that solely calculates a mathematical formula (see Benson) or a computer disk that solely stores a mathematical formula is not directed to the type of subject matter eligible for patent protection.
9. All of the claims in the instant application share this defect. In particular, none of the independent claims are restricted to any field of application, and therefore the claims are directed to all possible applications of the math recited in the claims.
10. The specification of the parent application, U.S. Patent Application 09/675,778, recites a variety of unrelated practical applications for the claimed mathematical results.
11. The only commonality between these different uses is the underlying mathematics.
12. Applicants claims are directed exclusively to the mathematics, and lack any recitation of specific and substantial practical application. Examiner therefore has determined that the claims attempt to patent every "substantial practical application" of an idea – a mathematical algorithm. Thus, the claims are non-statutory.

Response to Arguments

13. Examiner's arguments that were presented in the Examiner's Answer to Applicants' Appeal Brief in the parent application, U.S. Patent Application 09/675,778, are repeated here.
14. The Examiner finds that all of the claims in the application are held to be non-statutory under 35 U.S.C. § 101.
15. One may not patent every "substantial practical application" of an idea, law of nature or natural phenomena because such a patent "in practical effect be a patent on the [idea, law of nature or natural phenomena] itself." Gottschalk v. Benson, 409 U.S. 63, 71-72, 175 USPQ 673, 676 (1972).
16. The claims in Gottschalk were directed to a mathematical method running on a computer: converting binary-coded-decimal (BCD) numerals into pure binary numerals for use with general purpose digital computer of any type. Gottshcalk at 65.
17. The Supreme Court held in Gottschalk that "one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." Gottshcalk at 71-72.

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18. Therefore, whether a claim recites a machine implemented process is not determinative of whether that process claim is statutory. Thus, a claim that is nothing more than a machine-implemented abstract idea is invalid.

19. Moreover, the Supreme Court also held that "[h]ere the 'process' claim is so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion. The end use may (1) vary from the operation of a train[,] to verification of drivers' licenses[,] to researching the law books for precedents[;] and (2) be performed through any existing machinery or future-devised machinery or without any apparatus." Gottschalk at 68.

20. The Examiner finds that the claims in the instant application share the same characteristics as the claims in Gottschalk. The claims in the instant application are directed to a machine-implemented abstract idea. These claims are: (1) so abstract and sweeping as to cover both known and unknown uses of the underlying math, (2) so abstract and sweeping as to be applicable to a wide variety of unrelated applications, and (3) can be performed through any existing machinery or future-devised machinery or without any apparatus.

21. For example, independent claim 118 recites:

representing each of a plurality of systems as an application mode modeling physical quantities of said each system;

determining a representation of a partial differential equation for each application mode corresponding to one of said plurality of systems using at least one non-local coupling, said at least one non-local coupling determining a value in at least one portion of a domain depending on a value from at least one other portion of a domain, parameters of the partial differential equations being physical quantities of corresponding ones of said plurality of systems; and

outputting a model of the combined physical system using the partial differential equations corresponding to said plurality of systems, whereby the model represents a mathematical expression of the physical quantities of the combined physical system.

22. The outputs of independent claims 118 and 150 are mathematical "models", which are defined in the claims as follows: "whereby the model represents a mathematical expression of the physical quantities of the combined physical system."
23. Therefore, the claims cover a very wide range of unrelated "substantial practical applications (as defined in Gottschalk). According to applicants' own admission (see p.4 of the Appeal Brief in the parent U.S. Patent Application 09/675,778), such mathematical models with combined systems of partial differential equations can currently be used to represent the following types of unrelated physical systems:

- (1) Acoustics Models
- (2) Chemical Engineering Models
- (3) Electromagnetic Models
- (4) Fluid Dynamics Models
- (5) Geophysics Models
- (6) Heat Transfer Models
- (7) Multi-disciplinary and Multi-physics Models
- (8) Semiconductor Device Models
- (9) Structural Mechanics Models
- (10) Wave Propagation Models.

24. This is merely a partial list of the types of unrelated mathematical models that use a set of partial differential equations for each of the two or more selected application modes. All are covered by the claims in this patent application. The

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claims also cover all mathematical models that are unknown today but may become known in the future.

25. In the Appeal Brief (see p.9), the Appellant argues that “[t]he claimed invention allows engineers to model, test, and predict the response of a physical system without the need for the system to be built.” While this is true, the claims are not limited in the type of physical system, the type of response being modeled, nor in the details of the model itself (aside from being a combined set of partial differential equations).

26. Moreover, the Appellant’s Appeal Brief (see p.10) cites to the Court of Appeals for the Federal Circuit (CAFC) decisions in State Street Bank & Trust Co. v. Signature Financial Group Inc., 149 F.3d 1368 (Fed. Cir. 1998) (upholding a claim to a computer-calculated price for one share of a mutual fund). While State Street is a more recent case, it was decided by a lower court, and therefore does not overrule the Supreme Court decision in Gottschalk.

27. Moreover, the Examiner interprets the State Street decision differently than the Appellant does. The Appellant interprets State Street as upholding claims that input and output numbers, so long as the claim produces a “useful, concrete and tangible result.” The Examiner reads the case very differently. The Examiner interprets the holding in State Street to be narrow in scope: that a dollar value output is a “concrete, useful, tangible” result. The decision says so expressly (See State Street at 1373. Emphasis added):

Today, we hold that the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical

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calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces "a useful, concrete and tangible result"- a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.

28. The Examiner notes that the CAFC has upheld other computer-implemented algorithm claims, where the outputs were narrowly claimed. AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999) (upholding claims directed to a long-distance telephone billing process containing mathematical algorithms that generated PIC codes); In re Alappat, 33 F.3d 1526 (Fed. Cir. 1994) (upholding claims directed to computer-implemented mathematical algorithms that generated smooth waveform display on a rasterized monitor); Arrhythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed.Cir.1992) (upholding claims directed to the transformation of electrocardiograph signals from a patient's heartbeat by a machine through a series of mathematical calculations that output the condition of a patient's heart).

29. The common link between those cases was a test to determine whether the claimed invention produces a "**useful, concrete and tangible result.**" State Street at 1373. In comparison, independent claims 1, 42 and 82 in the instant application recite, a method for:

outputting a model of said combined physical system based on said combined set of partial differential equations for the two or more selected application modes for the said one of said plurality of systems, whereby the model represents a mathematical expression of the physical quantities of the combined physical system.

30. The Examiner finds that the output of a mathematical model falls under the Gottschalk ruling, because it is a claim that "is so abstract and sweeping as to cover both known and unknown uses." Examiner also respectfully disagrees with the Appellant in regards to the applicability of State Street. Examiner finds that "outputting a model of said combined physical system" is far too broad to constitute a "useful, concrete and tangible result." Examiner finds that all of the claims in the instant application share this defect.

Conclusion

31. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a bi-week, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753.

Any response to this office action should be faxed to (571) 273-8300, or mailed to:

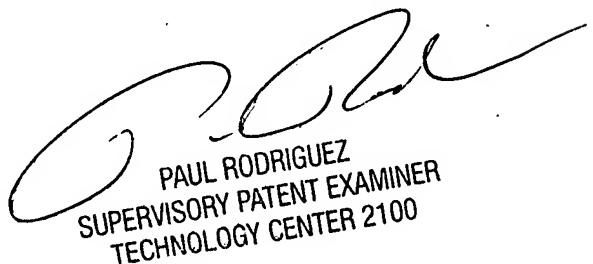
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or hand carried to:

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Alexandria, VA 22314

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Tech Center 2100 Receptionist, whose telephone number is (571) 272-2100.

Ayal I. Sharon
Art Unit 2123
October 14, 2007



PAUL RODRIGUEZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100